Introduction to Antibiotic Resistance and Stewardship

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Surveillance for Healthcare-Associated and Resistant Pathogens (SHARP) Symposium

What is Antibiotic Resistance?

Antimicrobial resistance (AMR) happens when bacteria, viruses, parasites, and fungi develop resistance against medicines that were previously able to cure them[1].

World health leaders have described antibiotic-resistant microorganisms as nightmare bacteria that pose a catastrophic threat to people in every country in the world[1].

1. CDC, *Antibiotic Resistance Threats in the United States, 2013*. https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf

Antibiotic Resistance is a Worldwide Threat

- Each year in the United States, at least 2 million people acquire serious infections with bacteria that are resistant to at least 1 antibiotic[1]
- New forms of antibiotic resistance spread across countries and continents[2]
- September 2016 – UN General Assembly met to address the root causes of AMR across multiple sectors, especially human health, animal health and agriculture[3]

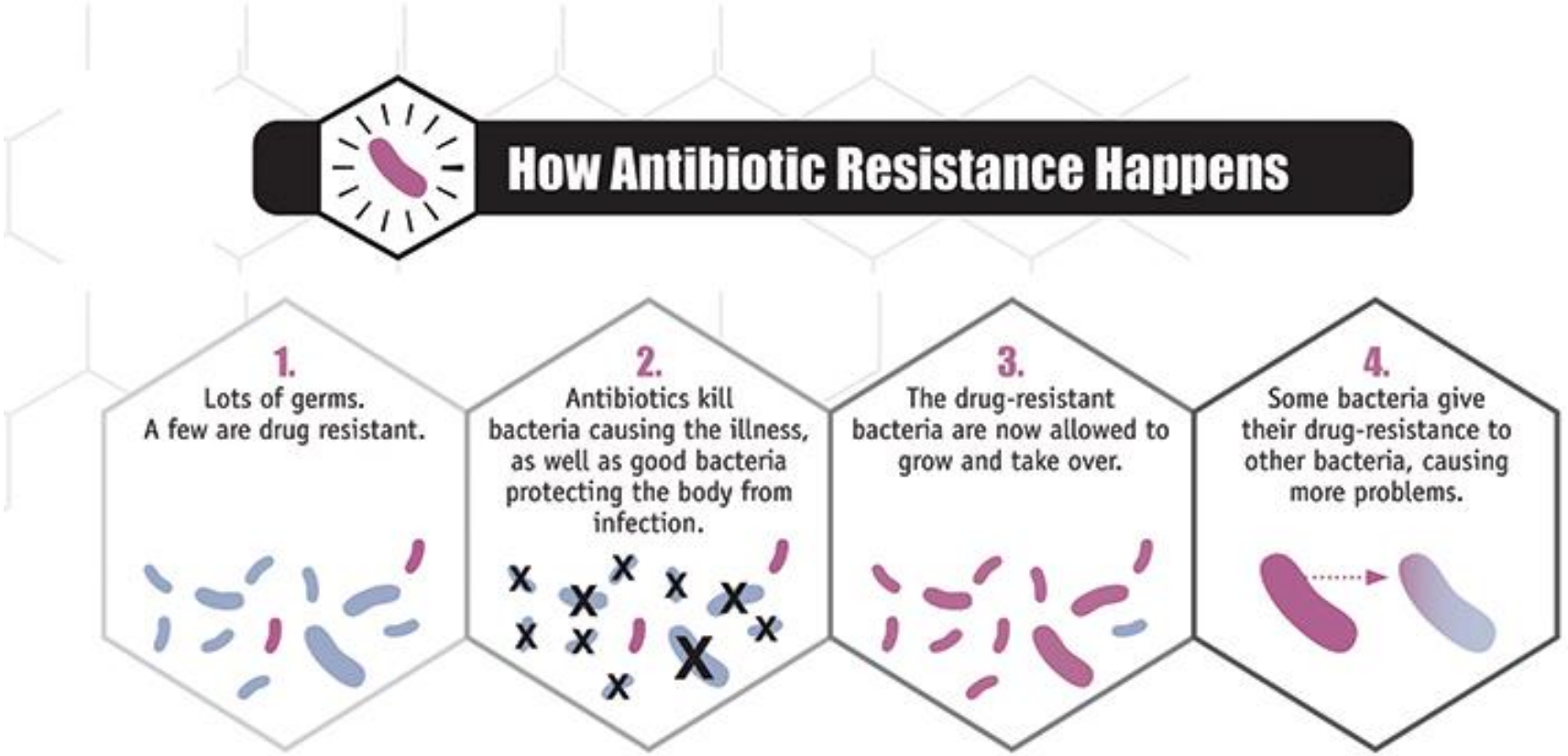
1. CDC, *Antibiotic Resistance Threats in the United States, 2013*. https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf
2. World Health Organization, *Antibiotic Resistance*. https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance
3. General Assembly of the United Nations, *PRESS RELEASE: High-level Meeting on Antimicrobial Resistance*. https://www.un.org/pga/71/2016/09/21/press-release-hl-

Antibiotic Overuse is Related to Increasing Resistance

- The use of antibiotics is the single most important factor leading to antibiotic resistance around the world
- Up to 50% of all the antibiotics prescribed for people are not needed or are not optimally effective as prescribed[1]
- Antibiotics are also commonly used in food animals to prevent, control, and treat disease, and to promote the growth of food-producing animals

1. CDC, *Antibiotic Resistance Threats in the United States, 2013.* https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf

How Resistance Occurs



https://www.cdc.gov/drugresistance/about/how-resistance-happens.html

Other Negative Effects of Antibiotic Overuse

Deaths and adverse events[1]

Most antibiotic-resistant infections require:

- Prolonged treatments or hospital stays
- More expensive treatments
- Greater disability and death
  - At least 23,00 people die each year as a result of antibiotic resistant infections
  - *C. difficile* causes 250,000 infections and 14,000 deaths each year

Economic burden[1]

- As high as $20 billion in excess direct healthcare costs
- Additional costs to society for lost productivity as high as $35 billion a year

1. CDC, *Antibiotic Resistance Threats in the United States, 2013*. https://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf

Types of Antibiotic Overuse

Prescribing

- Prescribed too long
- Wider spectrum than necessary
- Unnecessary prescription
- Agent not active against infection

Consumption

- Retaking previously prescribed antibiotics
- Online antibiotic orders
- Food animal growth promotion

4. Center for Infectious Disease Research and Policy, *Overuse and overprescribing of antibiotics*. http://www.cidrap.umn.edu/asp/overuse-overprescribing-of-antibiotics

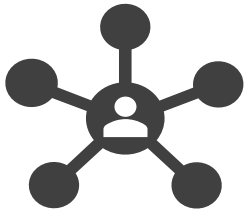
Antibiotic Stewardship

- An effort to prescribe as needed, not always less or more
- "the optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance"[5]
  - Goals:
    1. Give each patient the best antibiotic with the correct dose and duration
    2. Prevent overuse and misuse of antibiotics
    3. Minimize the development of resistance

5. Doron & Davidson, *Antimicrobial Stewardship*. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3203003/#R9

Antibiotic Stewardship in Facilities: Core Elements

Leadership Commitment: Dedicating necessary human, financial and information technology resources



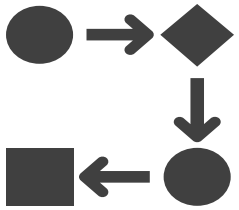
Accountability: Appointing a single leader responsible for program outcomes

Drug Expertise: Appointing a single pharmacist leader responsible for working to improve antibiotic use

6. CDC, *Core Elements of Hospital Antibiotic Stewardship Programs*. https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html

Tracking:

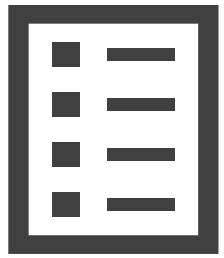
Monitoring antibiotic prescribing and resistance patterns



Action:

Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. “antibiotic time out” after 48 hours)

6. CDC, *Core Elements of Hospital Antibiotic Stewardship Programs*. https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html



Reporting:
Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff

Education:
Educating clinicians about resistance and optimal prescribing

6. CDC, *Core Elements of Hospital Antibiotic Stewardship Programs.* https://www.cdc.gov/antibiotic-use/healthcare/implementation/core-elements.html

Our Work at MDHHS

Identify needs and develop programs

- Mapping outpatient prescribing data to identify trends and implement interventions
  - Blue Cross
  - Medicaid
  - Collaboration to Harmonize Antimicrobial Registry Measures (CHARM)

Bring together partners, coordinate at the state level

AMS Subcommittee

- A multidisciplinary group of partners working in stewardship across the state

AMR Summit

- Fall conference to identify the state of resistance and stewardship in Michigan

Partnerships

- MARR, MHA, MPRO/LSQIN, MSHP, and others!

Questions?

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